

 Stagnant Standards Track: Interface

# EIP-2003: EVMC modules for implementations of precompiled contracts



|                        |                                                                                                       |
|------------------------|-------------------------------------------------------------------------------------------------------|
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| <b>Created</b>         | 2019-05-09                                                                                            |
| <b>Discussion Link</b> | <a href="https://github.com/ethereum/evmc/issues/259">https://github.com/ethereum/evmc/issues/259</a> |
| <b>Requires</b>        | EIP-1352                                                                                              |

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## Abstract

EVMC specifies a generic API for Ethereum execution engines. This EIP specifies a way of providing implementations of Ethereum precompiled contracts using the EVMC VM API.

## Specification

For the complete EVMC specification visit the EVMC documentation first. This EIP is based on and is compatible with EVMC ABI version 6.

The EVMC module with implementations of precompiled contracts SHOULD:

1. Advertise the `EVMC_CAPABILITY_PRECOMPILES` capability in the `get_capabilities()` method.
2. Implement the `execute()` method in the following way:

1. Validate the incoming execution request requirements:

1. The message kind ( `evmc_message::kind` ) is a call ( `EVMC_CALL` ).
2. The call destination address ( `evmc_message::destination` ) is within the range of precompiled contracts defined by EIP-1352.
3. There is no code provided (the `code` argument is `NULL` and `code_size` argument is `0` ).

If the requirements are not fulfilled, abort execution with the `EVMC_REJECTED` status code.

2. Check if the call destination address ( `evmc_message::destination` ) targets existing precompiled contract. Consider the EVM revision ( `evmc_revision` ) requested by the `rev` parameter of `execute()` .

If yes, execute as follows:

1. Inspect the input data ( `evmc_message::input_data` , `evmc_message::input_size` ) and calculate the *gas cost* of the execution.
  2. Compute the amount of *gas left* after execution by subtracting the *gas cost* from the call gas limit ( `evmc_message::gas` ).
  3. If *gas left* is negative, abort execution with the `EVMC_OUT_OF_GAS` status code.
  4. Otherwise, execute the code of the precompiled contract, return the `EVMC_SUCCESS` status code, the output and *gas left* ( `evmc_result::output_data` , `evmc_result::output_size` , `evmc_result::gas_left` ).
3. Otherwise, emulate execution of empty code by returning the `EVMC_SUCCESS` status code and *gas left* equal the call gas limit ( `evmc_message::gas` ).

Precompiled contract implementations are allowed to return two more EVMC error codes:

- `EVMC_FAILURE` if the failure was caused due to something other than out of gas (e.g. input validation error)
- `EVMC_REVERT` if the precompile doesn't want to forfeit all supplied gas (as of May 2019 no such precompile exists)

The Client is not required to provide the Host interface ( [ `evmc_context` ] argument of `execute()` is set to `NULL` ). Therefore, the precompiled contracts implementation

MUST NOT access the `evmc_context`.

## Rationale

It is very unlikely that any precompile will need to access or modify a contract state. Not requiring the Client to implement the EVMC Host interface removes the big portion of work needed for full EVMC integration.

## Test Cases

EVMC provides the `evmc-vmtester` tool for checking compatibility with the EVMC specification.

## Implementations

- Example of Precompiles VM implementation
- ewasm precompiles
- Aleth code for precompiles
- Parity code for precompiles
- EIP-1962 implemented as an EVMC precompile module

## References

- EVMC – Ethereum Client-VM Connector API
- EVMC documentation
- EVMC VM Implementation Guide
- EIP 1352: Specify restricted address range for precompiles/system contracts

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## Citation

Please cite this document as:

Paweł Bylica (@chfast), Alex Beregszaszi (@axic), "EIP-2003: EVMC modules for implementations of precompiled contracts [DRAFT]," *Ethereum Improvement Proposals*, no. 2003, May 2019. [Online serial]. Available: <https://eips.ethereum.org/EIPS/eip-2003>.